UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

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Federal Communications Commission
Office of the Secretary

Mr. Edmond J. Thomas
Chief, Office of Engineering and Technology
Office of Engineering and Technology
Federal Communications Commission
445 12th Street S.W.
Washington, DC 20554

Re: Amendment of Part 15 Regarding New Requirements and Measurement Guidelines for Access Broadband over Power Line Systems (FCC 04-29), ET Docket No. 04-37

Dear Mr. Thomas:

In our June 4, 2004, comments on the above-referenced NPRM, the National Telecommunications and Information Administration (NTIA) proposed excluded frequency bands, exclusion zones, coordination areas, and voluntary coordination to prevent interference from broadband over power line (BPL) systems to the most critical and vulnerable federal government radio communications. As examples of these special protections, NTIA proposed: exclusion of BPL from the 74.8 – 75.2 MHz aeronautical radionavigation band; exclusion zones around coastal stations that receive distress alerts in the 2,173.5 – 2,190.5 kHz band; and coordination areas around the National Radio Quiet Zone.

Since that time, NTIA has worked closely with agencies of the Interdepartment Radio Advisory Committee (IRAC) to identify all specific frequency bands and geographic areas within which these special protection mechanisms should be codified. The enclosure provides the results of this effort. Federal radio communications not specifically addressed in the proposed restrictions should be, for the most part, adequately protected in the near-term by the baseline interference prevention mechanisms specified in the NPRM (e.g., field strength limits, compliance measurement guidelines, and the prohibition of harmful interference).

As you may recall from NTIA's Phase 1 report, our initial estimate of frequency bands that might require special protection amounted to 5.4 percent of the 1.7 – 80 MHz spectrum. NTIA believes that the less burdensome proposals in the enclosure adequately protect federal radio communication systems from locally generated BPL emissions while minimizing restrictions on BPL. These proposals neither constrain deployment of In-House BPL systems nor significantly impede deployment of compliant Access BPL systems:

- Access BPL operations would be excluded nationwide from less than 2.18 percent of the 1.7 – 80 MHz spectrum resources;

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- Access BPL operations would be excluded from less than 0.0007 percent of the 1.7 – 80 MHz spectrum resources in limited geographic areas; and
- Prior coordination of Access BPL deployment using certain frequencies would apply in limited geographic areas wherein BPL deployment will not necessarily be constrained, depending on details of the planned BPL deployment.

Sincerely,

Fredrick R. Wentland
Associate Administrator
Office of Spectrum Management

Enclosure

ENCLOSURE

SPECIAL PROVISIONS REQUIRED FOR PREVENTION OF INTERFERENCE FROM BROADBAND OVER POWER LINE (BPL) SYSTEMS TO FEDERAL GOVERNMENT RADIO COMMUNICATIONS OPERATIONS

SUMMARY – The National Telecommunications and Information Administration (NTIA), based on recommendations from the Interdepartment Radio Advisory Committee (IRAC), has determined minimal sets of excluded bands, exclusion zones and coordination areas needed for prevention of interference from BPL systems to certain federal government radio operations in the 1.7 – 80 MHz frequency range. NTIA's proposals are summarized below and delineated in Annexes 2 – 4 in order of decreasing potential constraint on BPL deployment. Additional proposals may be needed if BPL devices are permitted to operate outside the 1.7 – 80 MHz frequency range, and the provisions proposed herein will not necessarily preclude harmful interference to the specially protected receivers under all circumstances.

- **Excluded Bands**: Access BPL emissions should be prohibited in the frequency bands listed in Annex 2. On this basis, less than 2.18% of national spectrum resources between 1.7 MHz and 80 MHz would be excluded for Access (but not In-House) BPL.

- **Exclusion Zones**: Emissions from Access BPL systems should be prohibited at the following frequencies within the specified exclusion zones, which amount to less than 0.0007% of national spectrum resources between 1.7 MHz and 80 MHz:
  - 2,173.5 – 2,190.5 kHz, within 1 kilometer (km) of the boundary of coast station facilities at the coordinates listed in Annex 3;
  - in the unlikely event that a new or relocated coast station is established for the 2,173.5 – 2,190.5 MHz band at a coordinate not specified in Annex 3, Access BPL operations in that frequency band should be excluded within 1 km of the new coast station facility;
  - 73.0 – 74.6 MHz, within 80 km of the coordinates of the ten (10) Very Long Baseline Array facilities listed in US311.

- **Coordination Areas**: Prior to deployment of Access BPL devices within the frequency bands and areas listed in Annex 4, parties responsible for such a BPL deployment should, via consultation with the point of contact specified in Annex 4, coordinate the planned Access BPL deployment. These consultations should, on a case-by-case basis, determine BPL frequency and power constraints needed to prevent harmful interference to radio receiver systems located within the specified coordination area. In the event that a new radio station of the type encompassed by a coordination area is established at a coordinate not specified in Annex 4, BPL operators should coordinate BPL devices located within the associated new coordination areas and corresponding frequency band. The operator of Access BPL devices shall abide by the Access BPL deployment or operating constraints determined in these consultations.

- **Voluntary Coordination**: BPL rules should enable interference prevention based on contact initiated by a local radio operator using information in the BPL database.

- **Other provisions**: BPL rules should affirm that the above and other BPL provisions do not necessarily preclude harmful interference and additional BPL constraints may be needed in some cases.

2. **BACKGROUND** – NTIA's BPL Phase 1 study identified frequency bands in the 1.7 – 80 MHz frequency range for which radio operations have been specially protected in the Federal Communication Commission's Rules or ITU Radio Regulations.[1] NTIA's Comments on the BPL Notice of Proposed Rule Making recommended special mechanisms for preventing interference in addition to the "baseline" protection afforded by field strength limits, prohibition of harmful interference from BPL systems, and compliance measurement provisions.[2, 3] However, NTIA's Comments did not delineate the frequencies and areas in which these special provisions would apply.

3. **GENERAL RATIONALE FOR PROPOSAL**

Excluded bands (Annex 2 of this document) place the greatest constraints on BPL deployment, including limitations on the flexibility for Access BPL systems to avoid other locally used radio frequencies. Thus, excluded bands should be considered mainly for frequency bands used for safety communications in situations where co-channel emissions from numerous BPL devices may be received via line-of-sight and ionospheric interfering signal paths.

Exclusion zones (Annex 3 of this document) should be applied to protect reception at known receiver locations where safety communications must operate with weak desired signals and coordination is unlikely to result in lesser constraints on BPL. Likewise, exclusion zones should be applied around sensitive radio astronomy sites, which generally are located in remote, lightly populated areas (i.e., little or no actual constraint on Access BPL market penetration).

Coordination areas (Annex 4 of this document) should be specified for receivers at known locations that must operate with very weak desired signals and where harmful interference must be prevented with a relatively high degree of certainty (rather than eliminated after discovery). Actual radio operating frequencies and other technical details should be considered during coordination consultations.

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[1] *Potential Interference from Broadband over Power Line (BPL) Systems to Federal Government Radiocommunications at 1.7 – 80 MHz*, NTIA Report 04-413, April 2004 (NTIA Phase 1 Study), at Table 4-9.

[2] Carrier Current Systems, including Broadband over Power Line Systems; ET Docket No. 03-104; Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems ET Docket No. 04-37, Notice of Proposed Rulemaking, 19 F.C.C. Rcd. 3335 (2004) (BPL NPRM).

[3] Comments of the National Telecommunications and Information and Information Administration (NTIA Comments) in ET Docket No. 04-37 (June 4, 2004) (available at www.ntia.doc.gov/ntiahome/fccfilings/2004/BPLComments_06042004.pdf and www.ntia.doc.gov/ntiahome/fccfilings/2004/BPLTechAppdx_06042004.pdf).

Annex 1 of this document provides the basis for proposed exclusion and coordination distances. The underlying interference predictions demonstrate that Access BPL systems located beyond these distances would:

- be unlikely to cause substantial interference, even given worst-case-oriented BPL deployment configurations; and
- present a very low probability of endangerment or actual harmful interference with respect to safety communications and non-safety communications, respectively.

ANNEX 1

COORDINATION DISTANCE AND EXCLUSION ZONE RADII

1. INTRODUCTION

NTIA analyzed the BPL emissions from a Medium Voltage power line model to determine the minimum dimensions of exclusion zones and coordination areas needed to prevent significant increases in the receiver noise floor. These areas, where BPL systems are either prohibited outright or may be restricted from transmitting in specific frequency bands by mutual agreement between BPL service providers and radio operators, are intended to substantially reduce the risk of harmful interference where warranted. These calculations consider only the effect of local BPL devices on radio receivers. Ionospheric propagation of distant BPL signals and ionospheric backscatter from local BPL devices are not considered.

NTIA's initial analyses of these distances employed a 5 dB height correction factor to account for stronger predicted levels of BPL emissions from the power line at heights other than that used for compliance measurements. In its Phase 1 study and Technical Appendix to the NTIA Comments on BPL, NTIA showed that the peak field strength typically occurs at heights greater than the 1 meter measurement height used for compliance testing below 30 MHz, and is often found at or near the height of the power line.[4] Adoption of NTIA's recommended height correction factor is not certain; therefore, NTIA's revised analysis no longer assumes this 5 dB correction (reduction of BPL emissions) in calculating the size of these protection areas.

The earlier analysis by NTIA also assumed that the receiver site antenna gain for fixed/or mobile-base stations was 0 dBi in the direction of the power line carrying BPL signals. This assumption was felt to be valid for many high-gain antennas operating in the near field of a BPL power line. However, NTIA conducted Numerical Electromagnetic Code (NEC) simulations with a representative high-gain antenna to validate this assumption and found that, in the direction of the BPL power line, the receiver antenna gain toward the power line may be as much as 5 dBi, depending on frequency. In response to these results, NTIA has revised its analysis to account for receiver antenna gain toward the power line.

2. ASSUMPTIONS

2.1 Communications Receivers

For the purpose of this analysis, NTIA assumed that the BPL signal sources will operate at the Part 15 limits, with these devices operating at the Class A Digital Device limits above 30 MHz. In accordance with the Commission's proposals in the BPL NPRM (Appendix C), the emissions from the BPL signal sources are scaled to meet the Part 15 limits at a measurement distance of 10 meters, based on field strength decay rates specified in Part 15 with distance extrapolation calculations using the slant range from the BPL device to the simulated point of measurement.

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[4] NTIA Phase I study, at § 5.3.6; NTIA Comments, at Technical Appendix § 2.3.

Comments by BPL proponents in the BPL Notice of Inquiry[5] indicate that commercial deployments are likely to result in BPL devices separated by ½ to 1 km.[6] To account for aggregation of multiple co-channel emission sources seen at an elevated, ground-based antenna, this analysis assumes that the antenna receives the equivalent of two equal-power BPL signals. This can encompass many more than two, co-channel BPL devices generating various field strength levels at the radio receiver.

The NEC power line model used in this analysis is the same model that was described in NTIA's Phase 1 Report.[7] This model is representative of a long, 3-phase Medium Voltage distribution line. The model parameters are:

- 340 meter power line lengths;
- 3 horizontally-oriented power lines spaced 0.6 meters apart;
- no neutral wire;
- conductors were modeled with conductivity characteristics of copper wire and AWG 4/0 diameter;
- the power lines are 8.5 meters above ground having average electrical parameter values;
- one outer power conductor was center-fed using a voltage source and series resistor to simulate a BPL coupler; and
- radiated field strength was scaled to meet Part 15 limits at 10 meters horizontal distance from the modeled power line.

The radio receiver antenna was previously modeled as being 42.7 meters above ground and having a gain of 0 dBi in the direction of the power line. NTIA developed a second model to address the typical gain in the direction of the power line for a high-gain receiver antenna. This high-gain antenna was patterned after a stacked log-periodic (LPDA) antenna in use by ARINC.[8] The NTIA antenna model has a maximum gain of approximately 14 dBi in the direction of the power line, for frequencies between 4 - 30 MHz.

NEC models assuming a gain of 0 dBi in the direction of the power line calculated the electric field at a point, and then translated this field into received power. In order to better model the interference potential to a communications receiver with a high-gain antenna, NTIA utilized NEC's "Maximum Coupling" facility to determine the loss of power between the modeled BPL source and the modeled LPDA's receive point.

The exclusion zones and coordination areas are intended to substantially reduce the risk of harmful interference to weak signal reception at these protected receiver sites. Their radii are

[5] *Inquiry Regarding Carrier Current Systems, including Broadband over Power Line Systems*, Notice of Inquiry, ET Docket No. 03-104, FCC 03-100, 18 F./C.C. Rcd. 8498 (2003) (BPL NOI).

[6] Reply Comments of PowerComm Systems, Inc., ET Docket 03-104 (August 20, 2003), at 16. Comments of Ambient Corporation, ET Docket 03-104 (July 7, 2003), at 5.

[7] NTIA Phase 1 study at § 5.4.2.

[8] TCI Model 527, Super High Gain Log-Periodic Antenna data sheet.

determined by noting the distance from the power line model where the noise floor is raised by a certain amount. The radii were chosen to be the distance beyond which the probability that a receiver experiences an increase in noise floor level (I+N/N) of 1 dB is 0 % for any broadside power line orientation. That is, relatively high radiation associated with BPL signal traveling wave modes was not considered. The BPL interfering signal power, I, was determined by the NEC simulations. The noise power, N, was assumed to be the lowest predicted median noise level for a quiet rural noise environment. The assumption of a quiet rural noise environment is reasonable, as most receiver sites dealing with weak signal reception were selected because they exhibit very low background noise levels. In addition, personnel at these sites (where manned) actively work with local utilities to prevent increases in ambient noise due to power line noise sources.

Quiet Rural Noise levels used in this analysis:

In 2.8 kHz BW:

4 MHz	-135.3 dBW
10 MHz	-136.7 dBW
15 MHz	-144.7 dBW
20 MHz	-147.9 dBW
25 MHz	-150.2 dBW

In 16 kHz BW:

30 MHz	-144.6 dBW
40 MHz	-147.5 dBW

2.2 Radio Astronomy at 73.0 – 74.6 MHz and Radar Receivers

The same power line structure described in Section 2.1 was used for analyses of impact on radio astronomy and radar receivers. These analyses employed a single BPL source operating at the Part 15 emissions limit (the Class A limit was used above 30 MHz). The protection requirement for both Very Long Baseline Array (VLBA) radio astronomy receivers in the 73.0 – 74.6 MHz frequency band and for radar receivers in the 1/7 – 30 MHz band is to limit the power flux density to a level less than -258 dBW/m^2-Hz.[9] The power flux density was calculated at heights of 20 meters for the radio astronomy receiver and 42.7 meters for the radar receiver.

NTIA's NEC far field simulation of the BPL power line calculated electric field strength values in all three polarizations, along the entire length of the power line and for a range of horizontal distances away from the power line. The peak electric field strength value at a given distance from the power line was used to calculate the power flux density using the relationship:

$$PFD = 10Log\left[\frac{E^2}{120\pi}\right]$$

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[9] VLBA and radar receivers both employ correlation techniques that enable reception of signals weaker than noise. The VLBA protection criteria are specified in ITU-R Recommentation ITU-R RA.769-2, Table 1.

where PFD is power flux density (dBW/m^2-Hz) and E is field strength (V/m).

Results were scaled such that the simulated BPL device met Part 15 limits. Results were further scaled to convert the output from the Part 15 limit bandwidth to the one Hertz bandwidth of the PFD requirement. Simulations using NEC were run to a distance of 20 km from the power line because NEC does not account for the diffraction losses at greater distances. For greater distances, exponential or logarithmic curves fit to the NEC data were used to extrapolate results, and diffraction losses determined from ITU-R Recommendation ITU-R P.526-6 were considered in addition to the extrapolated attenuation.

3. SUMMARY OF RESULTS

3.1 Communications Receivers

Figures 1-7 show the percentage of points along a BPL power line where the noise floor increase due to BPL emissions from 4 to 40 MHz exceeds 1 dB, in a receiver having antenna gain of 0 dBi towards the power line. Figures 8-10 show the results at 4, 15 and 25 MHz for a 14 dBi gain receiver site antenna having up to 5 dBi gain towards the power line. Figure 11 summarizes the minimum radii needed to limit the increase in noise floor level to 1 dB or less.

Figure 11 shows that distances beyond which a 1 dB increase in noise are predicted to be possible (i.e., distances where the curves meet the X axis) increase slowly as frequency increases from 1.7 MHz to over 10 MHz, mainly as a result of decreasing median noise power levels. Between 15 MHz and 30 MHz, the radiation efficiency of the BPL power line significantly increases the distances where the noise floor can increase by 1 dB or more. The gain of the modeled high-gain antenna in the direction of the BPL power line is greatest between 15 MHz and 30 MHz as well.

Thus, distance results for 4 MHz have been applied to establish the proposed 1 km exclusion zone dimension for the 2,173.5-2,190.5 kHz band used by coast stations. Upward rounding of the 4 MHz distance of 895 meters to 1 km and application of that distance from the boundary of the coast station facility accommodate receiver antenna location flexibility, error tolerance in the reported antenna coordinates, and the possibility that other BPL power line configurations not evaluated herein may generate higher field strength.

Among the frequencies considered, the largest distance within which a 1 dB increase in noise is predicted occurs at 25 MHz (distance of about 3.9 km). Upward rounding of this distance to 4 km would accommodate error tolerance in the reported antenna coordinates and the possibility that other BPL power line configurations and BPL signal aggregation not evaluated herein may generate higher field strength.

3.2 Radar Receivers

The results of the extrapolated NEC power flux density calculations for radar receivers operating at 25 MHz are depicted in Figure 12. The maximum power flux density levels exceed the -258 dBW/m^2/Hz threshold by about 5 dB at an 80 km distance from the power line. The ITU-R Rec. P.526-6 indicates that diffraction losses at an 80 km distance would ensure compliance with the -258 dBW/m^2-Hz threshold.

3.3 Radio Astronomy at 73.0 – 74.6 MHz

The extrapolated NEC power flux density calculations for radio astronomy at 74 MHz are shown in Figure 13. Maximum power flux densities about 3 dB above the -258 dBW/m^2/Hz threshold could be encountered at 80 km from the power line (as extrapolated from close-in data). The extrapolation is verified by NEC simulations at a distance of 80 km. The ITU-R Rec. P.526-6 indicates that diffraction losses at an 80 km distance would ensure compliance with the -258 dBW/m^2-Hz threshold.

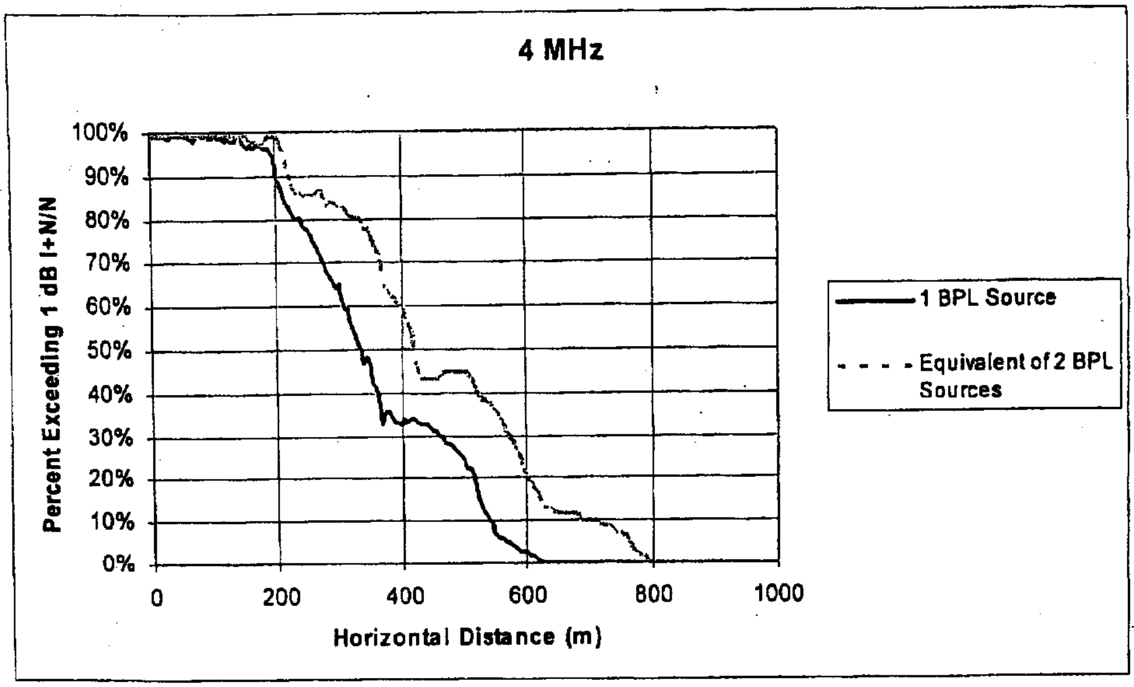

Figure 1 – Exclusion zone / coordination area radii for 4 MHz and 0 dBi receiver antenna gain toward the power line

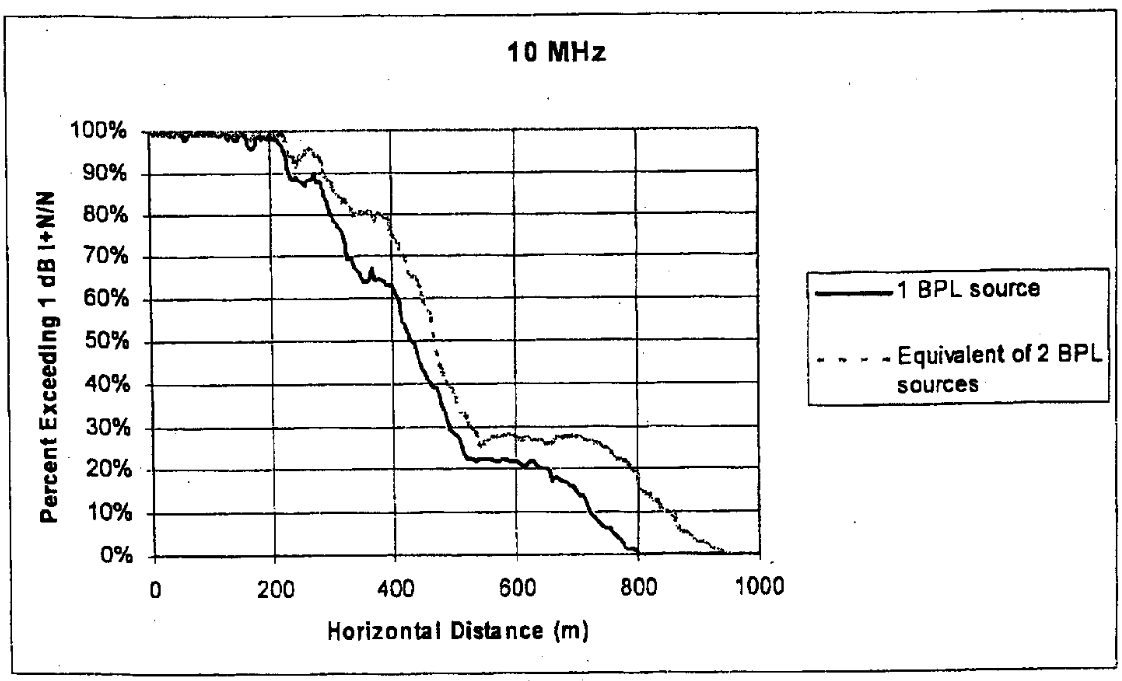

Figure 2 – Exclusion zone / coordination area radii for 10 MHz and 0 dBi receiver antenna gain toward the power line

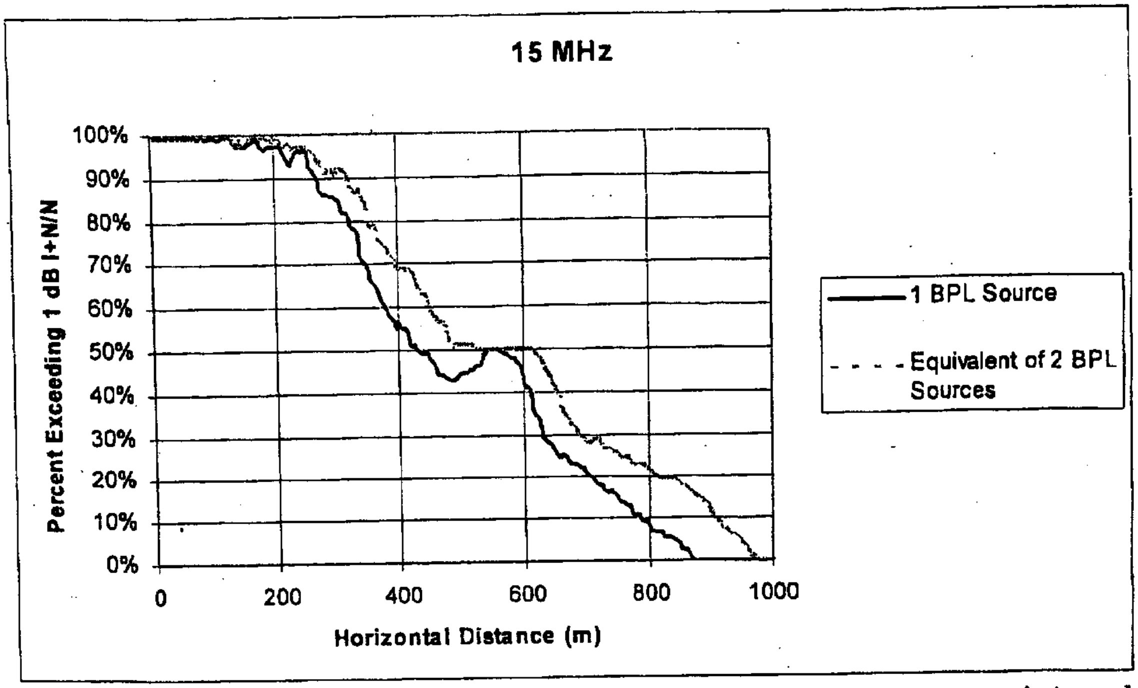

Figure 3 – Exclusion zone / coordination area radii for 15 MHz and 0 dBi receiver antenna gain toward the power line

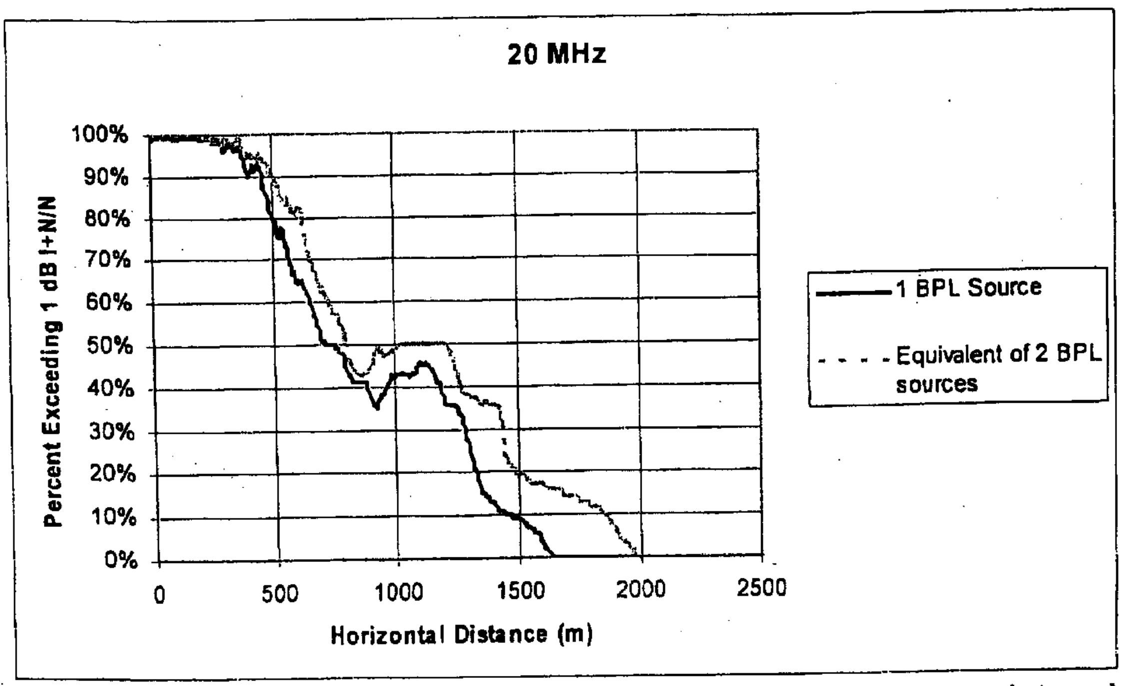

Figure 4 – Exclusion zone / coordination area radii for 20 MHz and 0 dBi receiver antenna gain toward the power line

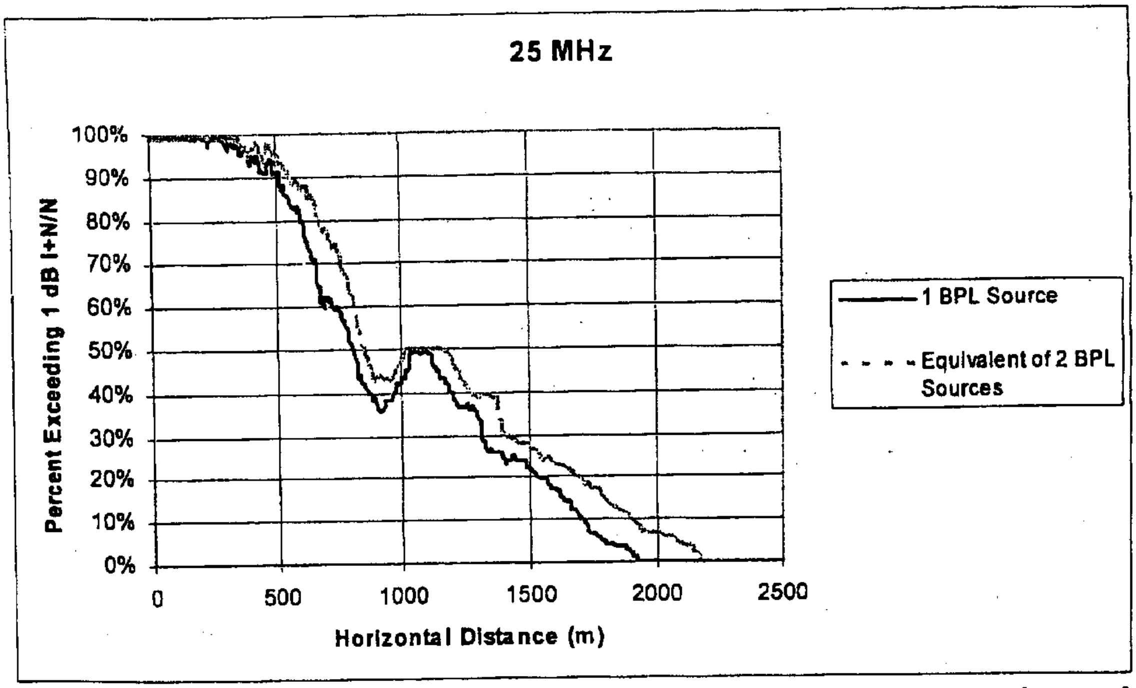

Figure 5 – Exclusion zone / coordination area radii for 25 MHz and 0 dBi receiver antenna gain toward the power line

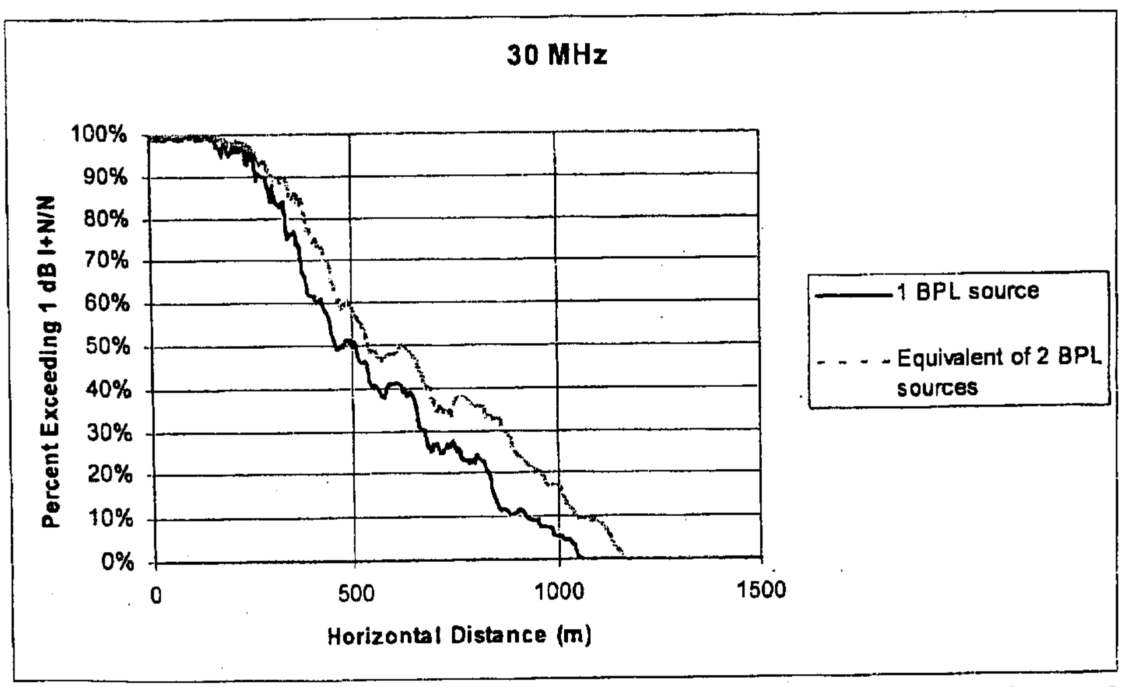

Figure 6 – Exclusion zone / coordination area radii for 30 MHz and 0 dBi receiver antenna gain toward the power line

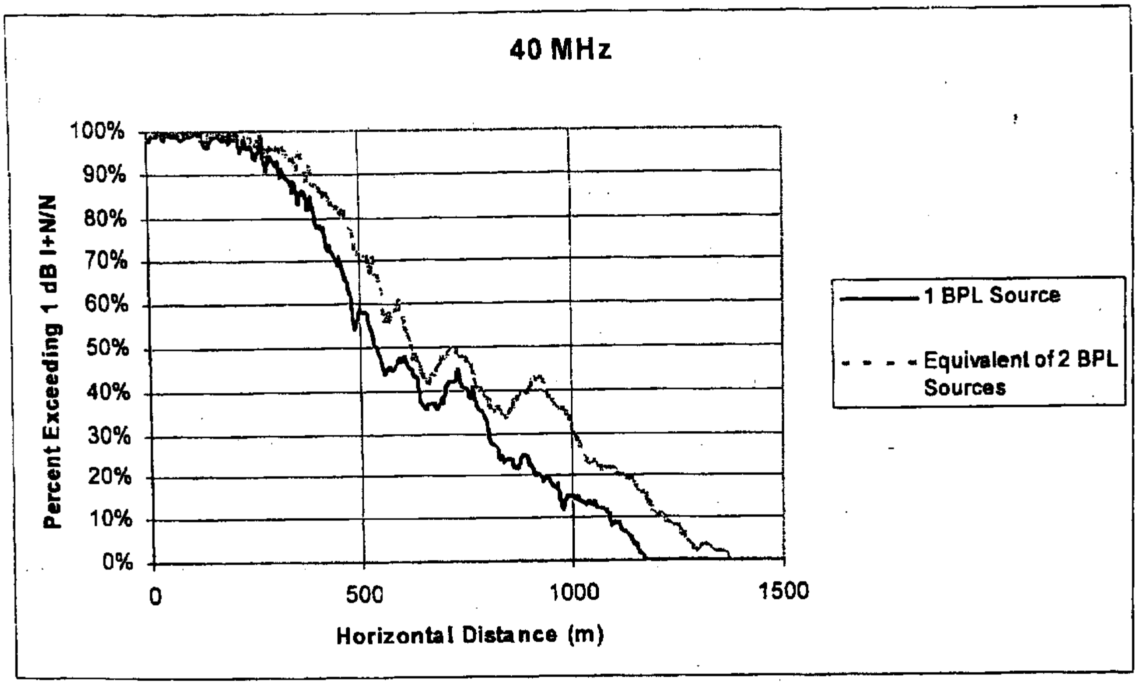

Figure 7 – Exclusion zone / coordination area radii for 40 MHz and 0 dBi receiver antenna gain toward the power line

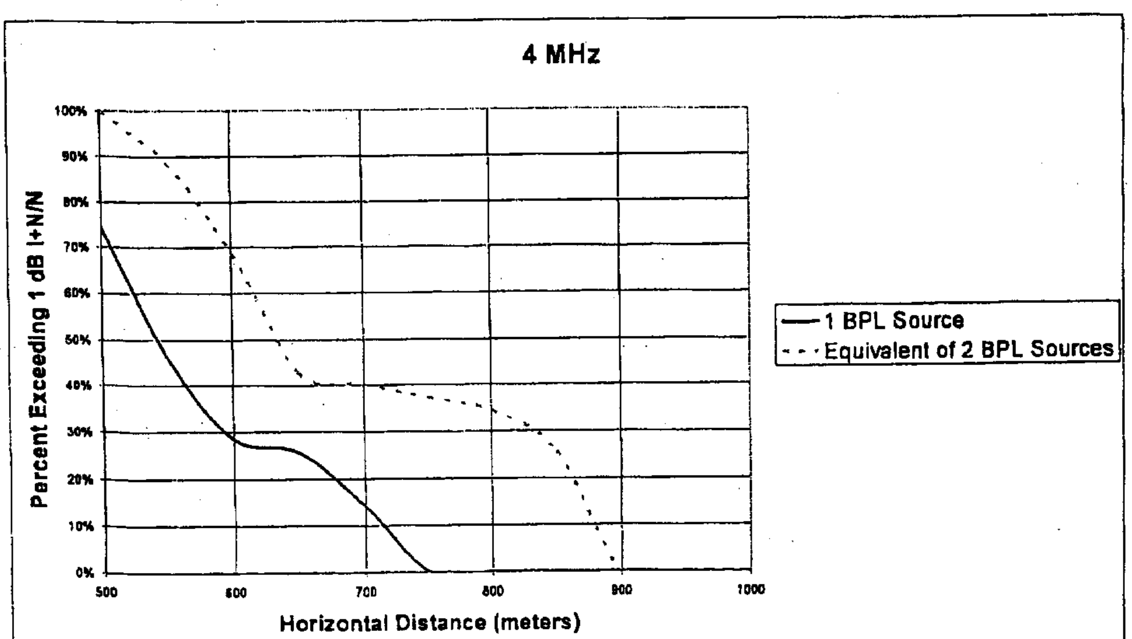

Figure 8 – Exclusion zone / coordination area radii for 4 MHz and 14 dBi receiver antenna

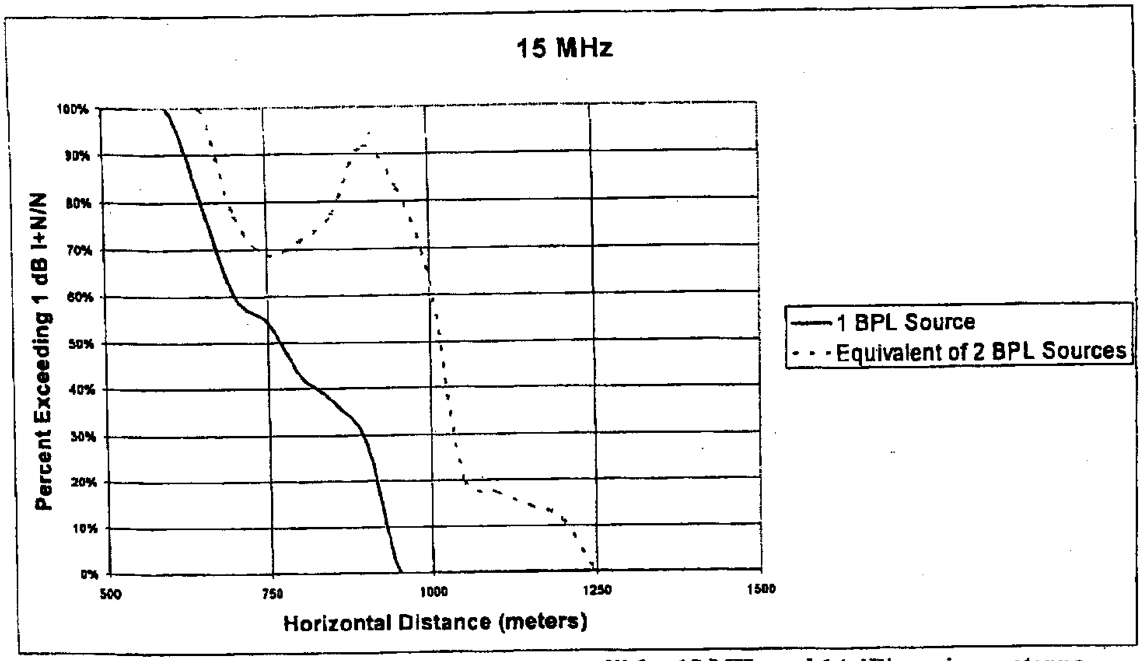

Figure 9 – Exclusion zone / coordination area radii for 15 MHz and 14 dBi receiver antenna

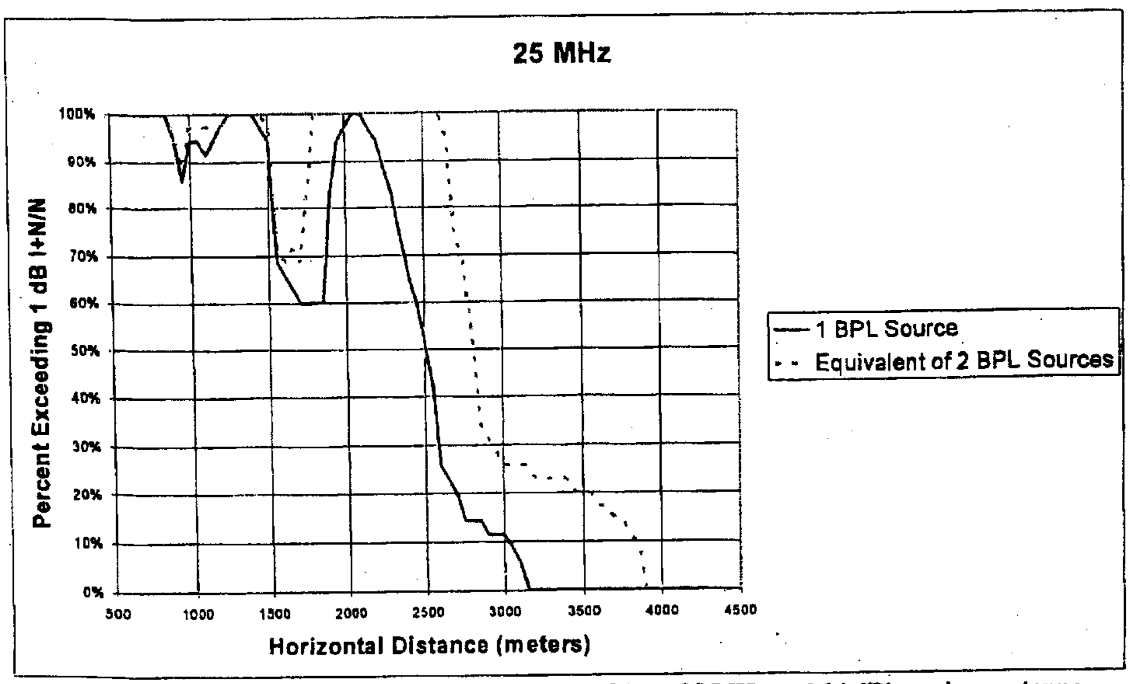

Figure 10 – Exclusion zone / coordination area radii for 25 MHz and 14 dBi receiver antenna

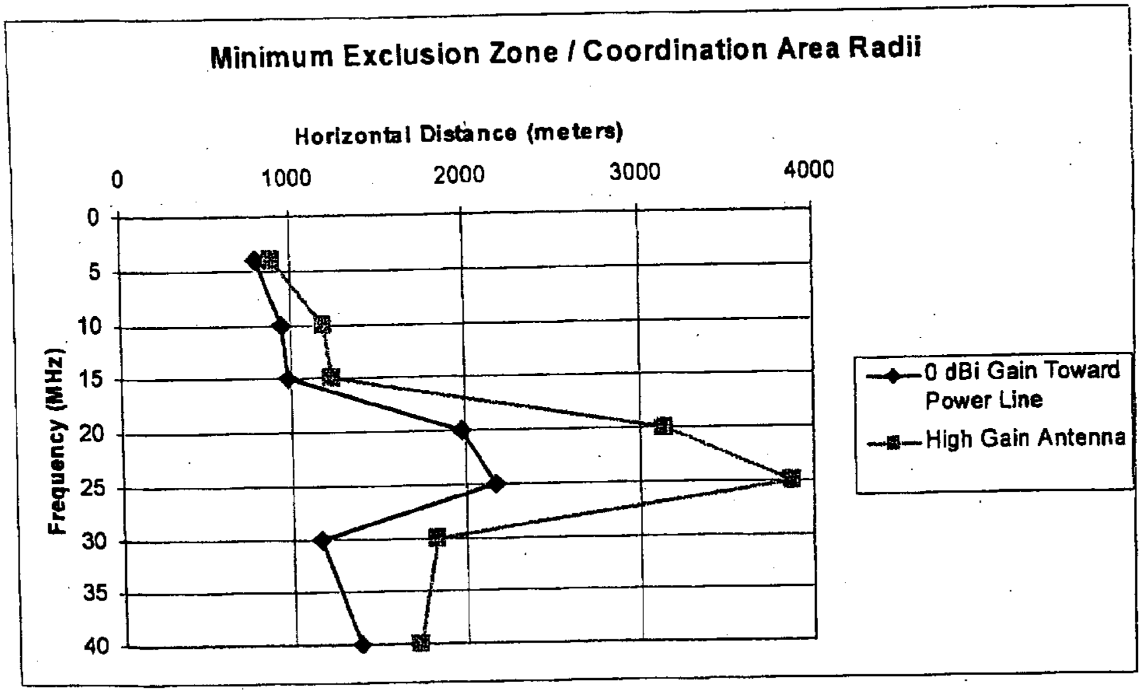

Figure 11 – Summary of minimum exclusion zone / coordination area radii to limit I+N/N to 1 dB or less

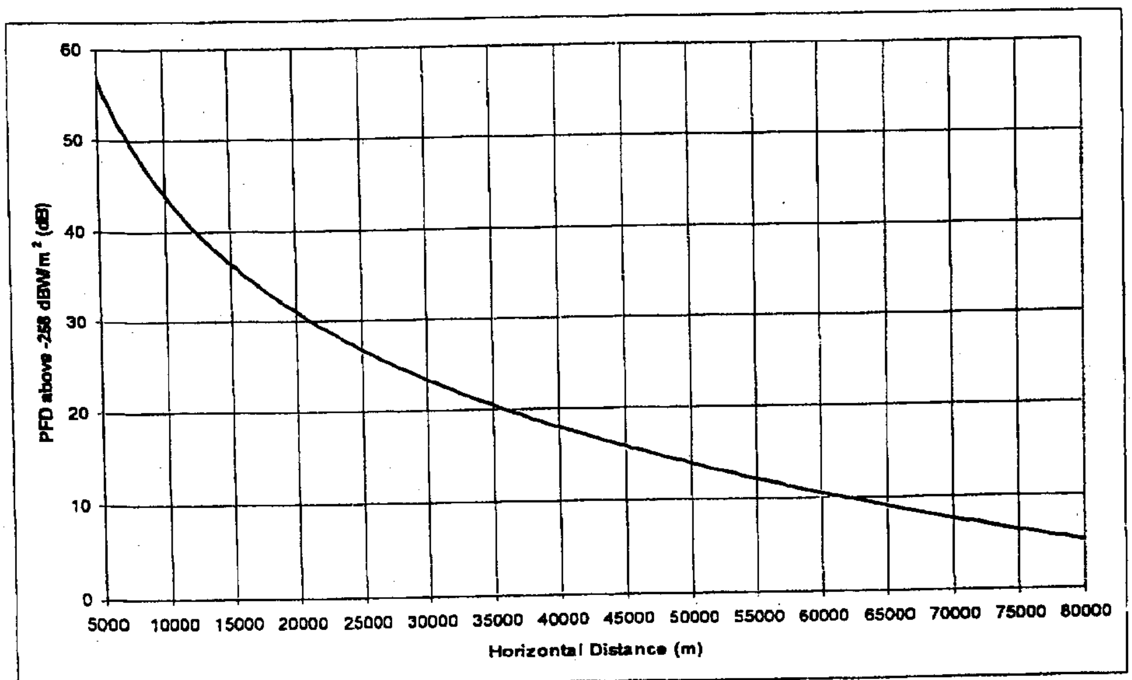

Figure 12 – Maximum Power Flux Density results for a Radar receiver vs. distance at 25 MHz (results extrapolated from 20 km to 80 km using logarithmic best-fit curve).

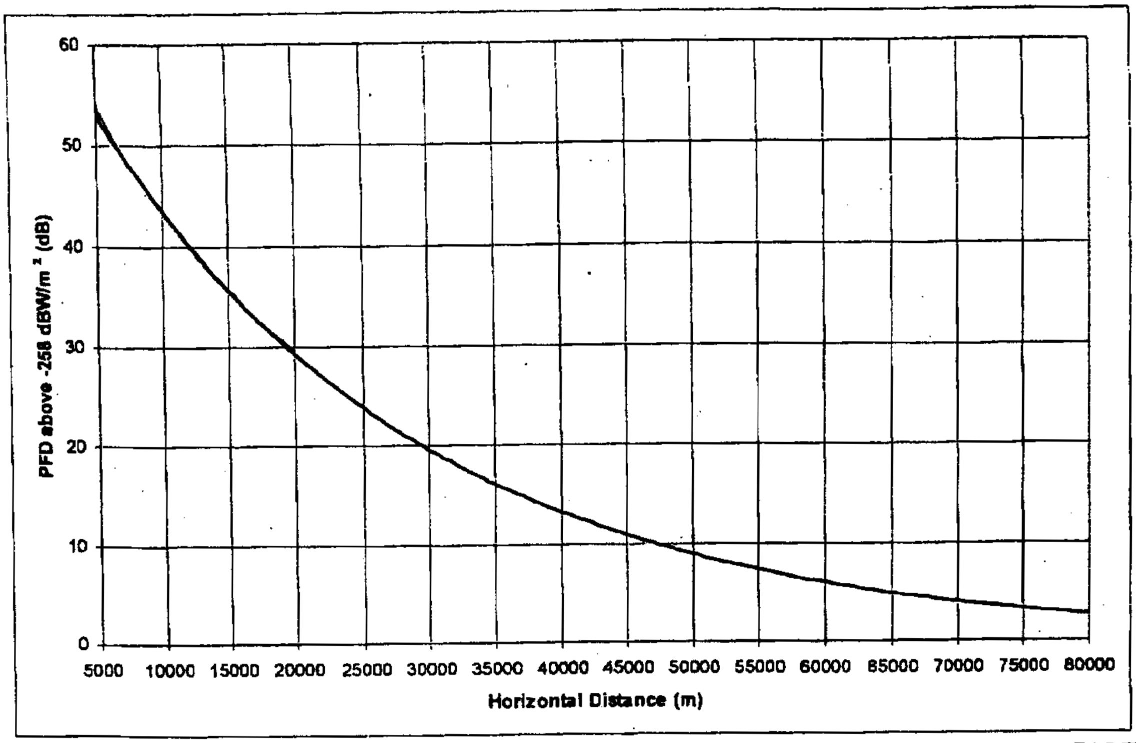

Figure 13 – Maximum Power Flux Density results for a Radio Astronomy receiver vs. distance at 74 MHz (results extrapolated from 20 km to 80 km using exponential best-fit curve).

ANNEX 2

EXCLUDED FREQUENCY BANDS

1. Introduction

Access BPL emissions should be excluded from aeronautical (R) mobile allocations in the 1.7 – 30 MHz frequency range and the 74.8 – 75.2 MHz aeronautical radionavigation band, as delineated in Table 2-1. Otherwise, with mature deployments of BPL devices: (1) reception of aeronautical safety communications by aeronautical (land or "base") stations would be endangered; (2) reception of aeronautical safety communications by aircraft would be endangered; and (3) at some aeronautical station or aircraft locations, emissions from In-House BPL devices at these frequencies will increase receiver noise levels such that additional interfering signals from Access BPL devices cannot be risked. This exclusion amounts to less than 2.18% of national spectrum resource between 1.7 MHz and 80 MHz.

2. Aeronautical (Land) Stations

As specified in the ICAO Convention, allocations for the aeronautical (R) mobile service are predominantly used for safety communications. Aeronautical (land) stations operating in the High Frequency (HF) spectrum in the United States use omni-directional antennas with about 6 dBi gain as well as higher gain, directional antennas, both of which have main beams oriented at fairly low elevation angles for reception of signals over lengthy ionospheric signal paths. These stations generally have been sited in areas having relatively low levels of ambient noise and the station operators are trained for reception of weak desired signals. Several factors (and analyses) conclusively show that Access BPL systems would cause harmful interference to these stations via ionospheric propagation of BPL signals. Desired aeronautical (R) signals at HF frequencies often are weak and fading; thus, they are particularly vulnerable to interference. NTIA's analysis of potential ionospheric interference from achievable Access BPL deployment densities in the U.S. marketplace show that a significant decrease in S/N can occur at sites where ambient noise is relatively low. This occurs, in part, because BPL systems radiate substantially higher emission levels toward the ionosphere than toward the heights at which FCC compliance measurements are proposed to be performed. Exacerbating this potential decrease in S/N, many other countries are implementing BPL, including Canada, and NTIA did not include in their initial analyses the additive interference from these foreign BPL operations.

3. Aircraft Receivers

Because aircraft in flight typically view areas exceeding 160,000 km^2, aircraft receivers over land can be in line-of-sight of many thousands of co-channel BPL devices (Access and In-House) in the absence of deployment density limits. It is not practical to limit deployment densities for In-House BPL devices and NTIA's Phase 1 study showed that just 300 co-channel Access BPL devices could cause a 10 dB or greater reduction in S/N at aircraft receivers via line-of-sight BPL signal paths at HF. Aircraft receiving aeronautical radionavigation signals in the 74-8 – 75.2 MHz band are similarly vulnerable to BPL emissions arriving over line-of-sight paths. Moreover, at HF, co-channel BPL interfering signals would arrive at aircraft via ionospheric paths and add to those arriving via line-of-sight paths.

Routed aircraft near or over land in the United States communicate with aeronautical stations in U.S. territory primarily using Very High Frequency (VHF) spectrum; hence, the distress alerting band 2,173.5 – 2,190,5 kHz does not need to be excluded nationwide (this distress alerting typically is at 121.5 MHz).

Table 2-1. Bands In Which Access BPL Emissions Are Prohibited

FREQUENCY BAND	TOTAL SPECTRUM (kHz)
2,850 – 3,025 kHz	175
3,400 – 3,500 kHz	100
4,650 – 4,700 kHz	50
5,450 – 5,680 kHz	230
6,525 – 6,685 kHz	160
8,815 – 8,965 kHz	150
10,005 – 10,100 kHz	95
11,275 – 11,400 kHz	100
13,260 – 13,360 kHz	100
17,900 – 17,970 kHz	70
21,924 – 22,000 kHz	76
74.8 – 75.2 MHz	400
TOTAL BANDWIDTH	1,706 kHz
U.S. AREA FACTOR	1.0
PORTION OF NATIONAL SPECTRUM RESOURCE AT 1.7 – 80 MHz	< 2.18% (area factor x bandwidth factor)

ANNEX 3

EXCLUSION ZONES

1. Coast Stations

Exclusion zones are required for the 2,173.5-2,190.5 kHz band within 1 km of coast station facilities located at the 106 coordinates listed in Table 3-1. This amounts to 0.022% of the bandwidth between 1.7 MHz and 80 MHz and less than 0.004% of U.S. territorial area, or less than 0.0000008% of national spectrum resource between 1.7 MHz and 80 MHz. This will prevent substantial endangerment of distress alerting by ships and aircraft in oceanic areas. In the event that an Access BPL operator plans to deploy numerous Access BPL devices at these frequencies in areas near these exclusion zones, it is suggested that they consult with the following point of contact to ensure that harmful interference is prevented at these facilities:

Commandant (CG 622)
U.S. Coast Guard
2100 2nd Street, S.W.
Washington, DC 20593 – 0001
Telephone: (202) 267 – 2860
E-Mail: cgcomms@comdt.uscg.mil

Table 3-1. Exclusion zones for U.S. Coast Guard Coast Stations

Locale	Latitude (decimal deg.)	Longitude (decimal deg.)
Group Guam	13.59	-144.84
GANTSEC	18.3	-65.78333333
Puerto Rico	18.47	-66.13
Honolulu	21.1	-157.75
Group Key West	24.56	-81.8
Trumbo Point CG Base	24.56616667	-81.79916667
Miami	25.62	-80.39
Everglades Park	25.8363	-81.38721667
Group Saint Petersburg (Everglades)	25.85	-81.39
Station Ft. Lauderdale	26.08928333	-80.11135
Station Ft. Myers Beach	26.45961667	-81.95438333
Group Miami (Ft. Pierce)	27.46	-80.31
Station Ft. Pierce	27.46401667	-80.30766667
Group Corpus Christi	27.7	-97.27
Group Corpus Christi	27.70191667	-97.27935
ESD Saint Petersburg	27.756	-82.62583333
Group Saint Petersburg	27.77	-82.63

Locale	Latitude (decimal deg.)	Longitude (decimal deg.)
Station Port O'Connor	28.43426667	-96.42776667
S. Padre Island	28.4395	-97.16583333
Freeport	28.93333333	-95.28333333
Group Galveston (Freeport)	28.94	-95.3
Station YANKEETOWN	29.03255	-82.71225
Station Ponce De Leon Inlet	29.05766667	-80.90866667
Group New Orleans (Grand Isle)	29.26	-89.96
Grande Isle	29.26466667	-89.95716667
Galveston	29.33333333	-94.77166667
Kapalan	29.3345	-94.78816667
Sabine	29.72383333	-93.869
Group Galveston (Sabine)	29.73	-93.87
New Orleans	29.88	-89.91
New Orleans	30.02133333	-90.12333333
Panama City	30.16716667	-85.0535
(Group Mobile (Panama City)	30.17	-85.76
ANT Jacksonville Beach	30.288	-81.403
Pensacola	30.34016667	-87.30483333
Group Mayport	30.38633333	-81.43366667
Group Mayport	30.39	-81.43
Ft. Morgan	30.652	-88.0535
Tybee Lighthouse	32.02108333	-80.84416667
Point Loma Lighthouse	32.66563333	-117.24305
Point Loma	32.66883333	-117.2375
Activities San Diego	32.73333333	-117.187
Group Charleston (Sullivan's Island)	32.75	-79.83
Sullivan's Island Lights	32.75083333	-79.83416667
Group Charleston	32.77366667	-79.94383333
Group San Diego	32.88	-118.44
San Pedro	33.75	-118.2663333
Group Fort Macon	33.89	-78.03
Point Mugu	33.99233333	-119.1216667
Group LA / Long Beach	34.12	-119.11
Channel Island	34.15483333	-119.22
Station Oxnard Channel Island	34.16195	-119.2221833
Group Ft. Macon	34.69666667	-76.68333333
Group Cape Hatteras	35.23333333	-75.53333333

Locale	Latitude (decimal deg.)	Longitude (decimal deg.)
Group Cape Hatteras	35.26	-75.53
Morro Bay (Cambria)	35.52266667	-121.056
San Clemente Island	32.84	-118.3875
Point Pinos	36.63666667	-121.935
CAMSLANT	36.73	-76.02
Group Hampton Roads	36.88383333	-76.353
Point Montara	37.52333333	-122.5133333
Point Montara Lighthouse	37.53588333	-122.51905
Group San Francisco	37.54	-122.52
Group San Francisco	37.80970003	-122.3654146
Point Bonita	37.81666667	-122.5283333
Group Eastern Shores	37.93	-75.38
Group Eastern Shore	37.93066667	-75.38285
CAMSPAC	38.1	-122.93
Point Arena Lighthouse	38.95501667	-124.74135
Point Arena	38.96	-123.74
Group Atlantic City	39.57	-74.52
Activities New York	40.60166667	-74.06
Activities New York	40.62	-74.07
ESD Moriches Hut	40.78866667	-72.74833333
Group Moriches	40.79	-72.75
Group Humboldt Bay	40.97816667	-124.1086667
Group Humboldt Bay	40.98	-124.11
Trinidad Head	41.05437644	-124.1507452
Group Long Island Sound	41.27	-72.9
Station New Haven	41.27	-72.90183333
Station Brant Point	41.27666667	-70.11733333
Group Woods Hole	41.29	-70.08
Station Castle Hill	41.45333333	-71.37
Group Woods Hole	41.50833333	-70.695
Boston Area	41.67	-70.53
Station Provincetown	42.03	-70.21166667
Eastern Point	42.60683333	-70.6575
Cape Blanco Lighthouse	42.8367	-124.5633667
Cape Blanco	42.838	-124.5646667
Group North Bend	43.4045	-124.223
Group North Bend	43.41	-124.24
Cape Elizabeth	43.558	-70.2
Group South Portland	43.64	-70.25

Locale	Latitude (decimal deg.)	Longitude (decimal deg.)
Group South Portland	43.646	-70.2475
Group SW Harbor	44.272	-68.30766667
Group Southwest Harbor	44.28	-68.31
Fort Stevens, Oregon	46.15408333	-123.8853667
Group Astoria	46.15833333	123.53
Group Astoria	46.16	-123.89
La Push	47.81666667	-124.6333333
Station Quillayute River	47.91368333	-124.6338167
Port Angeles	48.13333333	-123.4333333
Group Port Angeles	48.14	-123.41
Juneau (Sitka)	57.09	-135.26
Kodiak	57.68	-152.48
Valdez (Cape Hinchinbrook)	60.44	-146.43

2. Radio Astronomy Observatories

Using correlation techniques, Very Long Baseline Array (VLBA) receivers operate with desired signal levels well below ambient noise levels. Access BPL use of the 73.0 – 74.6 MHz band should be excluded within 80 km of the coordinates for the ten (10) VLBA facilities listed in allocation US311. This amounts to 2.04% of the bandwidth between 1.7 MHz and 80 MHz and less than 0.028% of U.S. territorial area, or less than 0.0006% of national spectrum resource between 1.7 MHz and 80 MHz.

ANNEX 4

COORDINATION AREAS

Part 15 of the Commission's Rules for carrier current systems apply the same field strength limits for wanted and unwanted emissions, and so, coordination should not be limited to the fundamental frequencies intentionally used in Access BPL systems. Moreover, frequencies used by many communications receivers in the 1.7 – 30 MHz frequency range are subject to change in the long-term and over hourly or shorter time frames. In light of these factors and given that the coordination areas needed for BPL systems are small, coordination should be required for all planned Access BPL operations at all frequencies of potential concern in these coordination areas. The following coordination areas are proposed:

- For frequencies in the 1.7 – 30 MHz frequency range, the areas within 4 km of facilities located at the following coordinates:
  - the Commission's protected field offices listed in §0.121, the point-of-contact for which is specified in that section;
  - the aeronautical stations listed in Table 4-1;
  - the land stations listed in Tables 4-2 and 4-3;
- For frequencies in the 1.7 – 38.25 MHz frequency range, the areas within 4 km of facilities located at the coordinates specified for radio astronomy facilities in US 311.
- For frequencies in the 1.7 – 80 MHz frequency range, the area within 1 km of the Table Mountain Radio Receiving Zone, the coordinates and point of contact for which are specified in Section 21.113(b) of the Commission's Rules.
- For frequencies in the 1.7 – 30 MHz frequency range, the areas within 80 km of radar receiver facilities located at the coordinates specified in Table 4-4.

Table 4-1. Coordination Area Coordinates for Aeronautical (OR) Stations (1.7 – 30 MHz)

POINT OF CONTACT
U.S. COAST GUARD HQ
DIVISION OF SPECTRUM MANAGEMENT CG-622
2100 SECOND ST., SW. RM. 6611
WASHINGTON, DC 20593
TEL: 202-267-6036
FAX: 202-267-4106
EMAIL: jtaboada@comdt.uscg.mil

Command Name	Geo Location	LAT	LONG
Washington	Arlington, VA	38.51.07N	077.02.15W
Cape Cod	Cape Cod, MA	41.42.00N	070.30.00W
Atlantic City	Atlantic City, NJ	39.20.59N	074.27.42W
Elizabeth City	Elizabeth City, NC	36.15.53N	076.10.32W

Command Name	Geo Location	LAT	LONG
Savannah	Savannah, GA	32.01.30N	081.08.30W
Miami	Opa Locka, FL	25.54.22N	080.16.01W
Clearwater	Clearwater, FL	27.54.27N	082.41.29W
Borinquen	Aguadilla, PR	18.18.36N	067.04.48W
New Orleans	New Orleans, LA	29.49.31N	090.02.06W
Traverse City	Traverse City, MI	44.44.24N	085.34.54W
San Diego	San Diego, CA	32.43.33N	117.10.15W
Sacramento	McCllelan AFB, CA	38.40.06N	121.24.04W
Astoria	Warrenton, OR	46.25.18N	123.47.46W
North Bend	North Bend, OR	43.24.39N	124.14.35W
Barbers Point	Kapolei, HI	21.18.01N	158.04.15W
Kodiak	Kodiak, AK	57.44.19N	152.30.18W
Houston	Houston, TX	29.45.00N	095.22.00W
Detroit	Mt. Clemens, MI	42.36.05N	082.50.12W
San Francisco	San Francisco, CA	37.37.58N	122.23.20W
Los Angeles	Los Angeles, CA	33.56.36N	118.23.48W
Humboldt Bay	McKinleyville, CA	40.58.39N	124.06.45W
Port Angeles	Port Angeles, WA	48.08.25N	123.24.48W
Sitka	Sitka, AK	57.05.50N	135.21.58W

Table 4-2. Coordination Area Coordinates for Land Stations, Set 1 (1.7 – 30 MHz)

POINT OF CONTACT
US COAST GUARD HQ
DIVISION OF SPECTRUM MANAGEMENT CG-622
2100 SECOND ST., SW. RM. 6611
WASHINGTON, DC 20593
TEL: 202-267-6036
FAX: 202-267-4106
EMAIL: jtaboada@comdt.uscg.mil

Command Name	Geo Location	LAT	LONG
COMMSTA Boston	Maspee, MA	41.4000N	070.3158W
Camslant	Chesapeake, VA	36.33.977N	076.15.389W
COMMSTA Miami	Miami, FL	25.36.973N	080.23.075W
COMMSTA New Orleans	Belle Chasse, IA	29.52.659N	089.54.766W
Camspac	Pt. Reyes Sta, CA	30.06.12N	122.56.09W
COMMSTA Honolulu	Wahiawa, HI	21.31.14N	157.59.47W
COMMSTA Kodiak	Kodiak, AK	57.40.44N	152.28.33W
Guam	Finegayan, GU	13.53.13N	144.50.34E

Table 4-3. Coordination Area Coordinates for Land Stations, Set 2 (1.7 – 30 MHz)

POINT OF CONTACT
COTHEN Technical Support Center
Primary: ROTHR Deputy Program Manager
Telephone: (540) 653 - 3624
Alternate: ROTHR Program Manager
Telephone: (800) 829-6336

Site Name*	Latitude *	Longitude*
Albuquerque, NM	35.0839N	105.5731W
Arecibo, PR	18.2908N	66.3759W
Atlanta, GA	32.5518N	84.3933W
Beaufort, SC	34.5730N	76.1636W
Cape Charles, VA	**37080N**	**755700W**
Cedar Rapids, IA	42.0026N	091.2943W
Denver, CO	39.2626N	103.5731W
Fort Myers, FL	81.5225N	26.3338W
Kansas City, MO	38.3696N	93.3635W
Las Vegas, NV	36.3544N	114.2927W
Lovelock, NV	40.0521N	118.3157W
Memphis, TN	34.3659N	090.0453W
Miami, FL	**254620N**	**801226W**
Morehead City, NC	34.5807N	78.2332W
Oklahoma City, OK	34.5146N	97.5147W
Orlando, FL	**283217N**	**812246W**
Reno, NV	38.5200N	119.2438W
Sarasota, FL	27.2115N	81.5225W
Wilmington, NC	34.4902N	78.0755W

* Bold entries still need to be verified

Table 4-4. Coordination Area Coordinates for Radar Receiver Stations (1.7 – 30 MHz)

POINT OF CONTACT
ROTHR Deputy Program Manager
(540) – 653 – 3624

LATITUTDE / LONGITUDE (degrees and minutes)
18° 01' N / 66° 30' W
28° 05' N / 98° 43' W
36° 34' N / 76° 18' W